Claims

WHAT IS CLAIMED IS:

1. A method for producing stable cell lines of mammalian neural precursor cells *in vitro*, comprising the steps of:

a) preparing a culture of neural precursor cells in a serum-free medium;

b) culturing the neural precursor cells in the presence of a first mitogen, wherein said first mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGFα and combinations thereof;

c) contacting the cells with an agent capable of being taken up by the cells and capable of expressing a c-myc gene; and

d) further culturing the cells in a medium containing the first mitogen and a second mitogen, wherein said second mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGFα, serum and combinations thereof, with the proviso that the second mitogen is other than the first mitogen.

2. The method of claim 1, wherein the c-myc gene is fused with other DNA elements, wherein said other DNA elements comprise at least one element selected from the group consisting of a ligand binding domain for an estrogen receptor, an androgen receptor, a progesterone receptor, a glucocorticoid receptor, a thyroid hormone receptor, a retinoid receptor, and an ecdysone receptor.

3. The method of claim 1, wherein said medium containing the first mitogen and the second mitogen further comprises a myc-activating chemical selected from the group consisting of β-estradiol, RU38486, dexamethasone, thyroid hormones, retinoids, and ecdysone.

4. The method of claim 1, wherein the mammalian neural precursor cells are derived from a human.

5. The method of claim 1, wherein the mammalian neural precursor cells are derived from an *in vitro* culture of pluripotent embryonic stem cells.

6. A cell line produced according to the method of claim 1.

7. The cell line of claim 6, wherein the cells maintain a multipotential capacity to differentiate into neurons, astrocytes and oligodendrocytes.

8. The cell line of claim 6, wherein the cells maintain a bipotential capacity to differentiate into neurons and astrocytes.

9. The cell line of claim 6, wherein the cells maintain a bipotential capacity to differentiate into astrocytes and oligodendrocytes.

10. The cell line of claim 6, wherein the cells maintain a unipotential capacity to differentiate into neurons.

11. The cell line of claim 6, wherein the cells maintain a unipotential capacity to differentiate into astrocytes.

12. A method for producing stable clonal cell lines of mammalian neural precursor cells *in vitro*, comprising the steps of:

a) preparing a culture of neural precursor cells in a serum-free medium;

b) culturing the neural precursor cells in the presence of a first mitogen, wherein said first mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGFα and combinations thereof;

c) contacting the cells with an agent capable of being taken up by the cells and capable of expressing a c-myc gene and a selectable marker;

d) further culturing the cells in a medium containing the first mitogen and a second mitogen, wherein said second mitogen is selected from the group consisting of aFGF, bFGF, EGF, TGFα, serum and combinations thereof, with the proviso that the second mitogen is other than the first mitogen; and

e) collecting c-myc treated cells and co-culturing them with feeder cells free of the selectable marker and capable of supporting survival of the c-myc treated cells in a medium containing the first mitogen and the second mitogen, with the proviso that the second mitogen is other than the first mitogen.

13. The method of claim 12, wherein the c-myc gene is fused with other DNA elements, wherein said other DNA elements comprise at least one element selected from the group consisting of a ligand binding domain for an estrogen receptor, an androgen receptor, a progesterone receptor, a glucocorticoid receptor, a thyroid hormone receptor, a retinoid receptor, and an ecdysone receptor.

14. The method of claim 12, wherein said medium containing the first mitogen and the second mitogen further comprises a myc-activating chemical selected from the group consisting of β-estradiol, RU38486, dexamethasone, thyroid hormones, retinoids, and ecdysone.

15. The method of claim 12, wherein the mammalian neural precursor cells are derived from a human.

16. The method of claim 12, wherein the mammalian neural precursor cells are derived from an *in vitro* culture of pluripotent embryonic stem cells.

17. A cell line produced according to the method of claim 12.

18. The cell line of claim 17, wherein the cells maintain a multipotential capacity to differentiate into neurons, astrocytes and oligodendrocytes.

19. The cell line of claim 17, wherein the cells maintain a bipotential capacity to differentiate into neurons and astrocytes.

20. The cell line of claim 17, wherein the cells maintain a bipotential capacity to differentiate into astrocytes and oligodendrocytes.

21. The cell line of claim 17, wherein the cells maintain a unipotential capacity to differentiate into neurons.

22. The cell line of claim 17, wherein the cells maintain a unipotential capacity to differentiate into astrocytes.